

Application Serial No.: 10/723,944

## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) An apparatus comprising:
  - an accelerator waveguide comprising an ~~end-cavity~~end accelerating cavity, the accelerator waveguide to output first particles from the ~~end-cavity~~end accelerating cavity at a first energy in a first mode and to output second particles from the ~~end-cavity~~end accelerating cavity at a second energy in a second mode; and
  - a detuning device coupled to the ~~end-cavity~~end accelerating cavity, the detuning device to selectively detune the ~~end-cavity~~end accelerating cavity.
2. (currently amended) The apparatus according to Claim 1, the detuning device comprising:
  - a probe movable between a first position in the first mode and a second position within the ~~end-cavity~~end accelerating cavity in the second mode.
3. (currently amended) The apparatus according to Claim 1, the detuning device comprising:
  - an electrical circuit including an electrical conductor, a portion of the electrical conductor disposed within the ~~end-cavity~~end accelerating cavity.
4. (currently amended) The apparatus according to Claim 3, wherein a characteristic of the electrical circuit is controllable to selectively detune the ~~end-cavity~~end accelerating cavity.
5. (previously presented) The apparatus according to Claim 3, the electrical circuit comprising:
  - a first coaxial cable coupled to the electrical conductor;
  - a second coaxial cable; and
  - a switch to selectively couple the first coaxial cable to the second coaxial cable.

Application Serial No.: 10/723,944

6. (previously presented) The apparatus according to Claim 1, further comprising:  
an RF power source to transmit a first wave having a first power to the accelerator waveguide in the first mode, and to transmit a second wave having a second power to the accelerator waveguide in the second mode.

7. (previously presented) The apparatus according to Claim 1, further comprising:  
a particle source to inject particles at a first current into the accelerator waveguide in the first mode, and to inject particles at a second current into the accelerator waveguide in the second mode.

8. (currently amended) The apparatus according to Claim 1, further comprising:  
a control unit to receive an instruction to switch from the first mode to the second mode, and to control the detuning device to detune the ~~end-cavity~~end accelerating cavity in response to the instruction.

9. (currently amended) A method comprising:  
operating an accelerator waveguide to output first particles from a tuned ~~end-cavity~~end accelerating cavity of the accelerator waveguide at a first energy;  
detuning the ~~end-cavity~~end accelerating cavity; and  
operating the accelerator waveguide to output second particles from the detuned ~~end cavity~~end accelerating cavity at a second energy.

10. (currently amended) The method according to Claim 9, wherein detuning the ~~end cavity~~end accelerating cavity comprises:  
changing a resonant frequency of the ~~end-cavity~~end accelerating cavity.

11. (currently amended) The method according to Claim 9, wherein detuning the ~~end cavity~~end accelerating cavity comprises:  
moving a probe to a position within the ~~end-cavity~~end accelerating cavity.

Application Serial No.: 10/723,944

12. (currently amended) The method according to Claim 9, wherein detuning the ~~end cavity~~ end accelerating cavity comprises:

changing an electrical characteristic of a circuit coupled to the ~~end cavity~~ end accelerating cavity.

13. (previously presented) The method according to Claim 12, wherein the electrical characteristic is an impedance of the circuit.

14. (currently amended) The method according to Claim 12, wherein changing the electrical characteristic of the circuit comprises:

coupling a coaxial cable to the ~~end cavity~~ end accelerating cavity.

15. (currently amended) The method according to Claim 9, wherein operating the accelerator waveguide to output first particles from the tuned ~~end cavity~~ end accelerating cavity at the first energy comprises:

operating an RF power source to deliver a wave having a first power to the accelerator waveguide, and

wherein operating the accelerator waveguide to output second particles from the detuned ~~end cavity~~ end accelerating cavity at the second energy comprises:

operating the RF power source to deliver a wave having a second power to the accelerator waveguide.

16. (currently amended) The method according to Claim 9, wherein operating the accelerator waveguide to output first particles from the tuned ~~end cavity~~ end accelerating cavity at the first energy comprises:

operating a particle source to inject particles at a first current into the accelerator waveguide, and

wherein operating the accelerator waveguide to output second particles from the detuned ~~end cavity~~ end accelerating cavity at the second energy comprises:

operating the particle source to inject particles at a second current into the accelerator waveguide.

Application Serial No.: 10/723,944

17. (currently amended) The method according to Claim 9, further comprising:  
receiving an instruction to switch between operation of the accelerator waveguide at the first energy and operation of the accelerator waveguide at the second energy; and  
automatically detuning the ~~end-cavity~~end accelerating cavity in response to the instruction.
18. (currently amended) A medium storing processor-executable process steps, the steps comprising:  
a step to operate an accelerator waveguide to output first particles from a tuned ~~end-cavity~~end accelerating cavity of the accelerator waveguide at a first energy;  
a step to detune the ~~end-cavity~~end accelerating cavity; and  
a step to operate the accelerator waveguide to output second particles from the detuned ~~end-cavity~~end accelerating cavity at a second energy.
19. (currently amended) The medium according to Claim 18, wherein detuning the ~~end-cavity~~end accelerating cavity comprises:  
a step to change a resonant frequency of the ~~end-cavity~~end accelerating cavity.
20. (currently amended) The medium according to Claim 18, wherein detuning the ~~end-cavity~~end accelerating cavity comprises:  
a step to move a probe to a position within the ~~end-cavity~~end accelerating cavity.
21. (currently amended) The medium according to Claim 18, wherein detuning the ~~end-cavity~~end accelerating cavity comprises:  
a step to change an electrical characteristic of a circuit coupled to the ~~end-cavity~~end accelerating cavity.
22. (previously presented) The medium according to Claim 21, wherein the electrical characteristic is an impedance of the circuit.

Application Serial No.: 10/723,944

23. (currently amended) The medium according to Claim 21, wherein the step to change the electrical characteristic of the circuit comprises:

a step to couple a second coaxial cable to the ~~end-cavity~~end accelerating cavity.

24. (currently amended) The medium according to Claim 18, wherein the step to operate the accelerator waveguide to output first particles from the tuned ~~end-cavity~~end accelerating cavity at the first energy comprises:

a step to operate an RF power source to deliver a wave having a first power to the accelerator waveguide, and

wherein the step to operate the accelerator waveguide to output second particles from the ~~detuned end-cavity~~detuned end accelerating cavity at the second energy comprises:

a step to operate the RF power source to deliver a wave having a second power to the accelerator waveguide.

25. (currently amended) The medium according to Claim 18, wherein the step to operate the accelerator waveguide to output first particles from the tuned ~~end-cavity~~end accelerating cavity at the first energy comprises:

a step to operate a particle source to inject particles at a first current into the accelerator waveguide, and

wherein the step to operate the accelerator waveguide to output second particles from the ~~detuned end-cavity~~detuned end accelerating cavity at the second energy comprises:

a step to operate the particle source to inject particles at a second current into the accelerator waveguide.

26. (currently amended) The medium according to Claim 18, further comprising:

a step to receive an instruction to switch between operation of the accelerator waveguide at the first energy and operation of the accelerator waveguide at the second energy; and

a step to automatically detune the ~~end-cavity~~end accelerating cavity in response to the instruction.